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ABSTRACT

The Maryland Task Force on the Use of Computers in Instruction conducted a statewide survey of the following components of a successful computer education program: planning; curriculum development; staff development; computer use; instructional equity; selection, maintenance, and evaluation of hardware and courseware; and parent and community involvement. In response to the results of this survey, the Task Force developed 34 recommendations for improvements in the above areas; in addition it offered suggestions for: (1) state certification guidelines for computer science teachers; (2) increased collaboration with higher education in providing staff with inservice computer training; (3) staff visits to computer demonstration sites; and (4) the establishment of a communications networking process for teachers and administrative and supervisory staff. In order to provide leadership and direction for computer education programs in Maryland, the Task Force also developed a model framework for computer education based upon existing curricula for computer literacy and computer science. (JB)

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REPORT OF TASK FORCE ON USE OF

COMPUTERS IN INSTRUCTION

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ACKNOWLEDGEMENTS

The recommendations of the Maryland Task Force on Use of Computers in Instruction result from an extraordinary amount of work by a great many people throughout the state. Task Force members not only participated actively in the regular meetings, but each member served on one or more subcommittees that conducted studies and prepared recommendations outside of the regular meeting times.

The 24 local school superintendents and their staffs not only supported the creation of the Task Force but also completed an extensive statewide survey, reacted thoughtfully to the draft of "Programmatic Definition for Computer Education" and permitted staff in the systems to serve in a variety of ways with the Task Force.

Members of the Maryland State Department of Education provided strong support to the work of the Task Force. In particular, Dr. Glen Cutlip and Ms. Paula Montgomery are commended for their outstanding and indispensable contribution.

Richard J. Deasy
Assistant State
Superintendent for
Instruction
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on Use of Computers
in Instruction

TASK FORCE ON USE OF COMPUTERS IN INSTRUCTION

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INTRODUCTION

The Maryland Task Force on Use of Computers in Instruction was created by the State Superintendent in response to a request from local school superintendents for a coordinated study of the issues and needs posed by the advent of computer technology in the schools.

Dr. Joseph Shilling, the Deputy Superintendent, convened the Task Force in March 1983 and asked that it provide recommendations that would:

- Provide a framework that could be used by local school systems as they seek to integrate the use of computers into education programs;
- Determine what is needed to help local school systems move ahead as intelligently and successfully as possible;
- Suggest what services are needed and help determine who should deliver those services.

To meet this charge the Task Force surveyed the current status of computer use in the schools of the state; considered reports from experts in the field of computer use in Maryland and throughout the nation; and sought the advice of teachers, administrators, and other persons concerned with the issues.

During its deliberations, the Task Force released its survey results and circulated drafts of the programmatic definition developed as the conceptual framework for computer education. The Task Force also convened teachers from subject and skill areas to comment on computer applications in their respective fields. The work of the Task Force was strengthened by the advice and comments from the local school systems in response to these actions.

Computer education is a complex matter with many implications at all levels of schooling. The Task Force has attempted to provide a broad framework within which the various aspects of computer use in instruction can be considered. It has attempted to identify the major issues that need to be addressed as schools move within this framework to implement programs. It offers approaches to these issues that will put Maryland in a position to integrate computer use in appropriate ways over the coming years.

The Task Force was not asked to conduct financial analyses of its recommendations. Obviously, these costs will need to be addressed. The Task Force has attempted to chart the appropriate direction for such implementation and assumes that the State Superintendent in conjunction with the local school superintendents will further examine the financial issues.

Timeline of Accomplishments

MARCH 1983	Initial Meeting Identified Topics of Concern
APRIL	Curriculum Subgroup Work Literature/Data Search
MAY	Statewide Survey Development Draft Programmatic Definition
JUNE	Becker Briefing on National Trends Endorsed Maryland Instructional Resources Network Group Purchasing Discussed Discussed Clearinghouse Issues
JULY	Approved Programmatic Definition Planned the Future Discussions of Needs
AUGUST	Curriculum Subgroup Work Survey Completed and Approved
SEPTEMBER	State Board of Education Briefing Approved Computer Education Liaison Group Interim Briefing of LEA Superintendents Needs Subgroup Formed
OCTOBER	Discussed and made Recommendations on Certification Staff Development Higher Education Briefing of LEA Assistant Superintendents
NOVEMBER	Charge to Curriculum Subgroup Discussed and made Recommendations on
DECEMBER	Computer Equity Curriculum Subgroup Work
JANUARY 1984	Accepted Newsletter Proposal Discussed and made Recommendations on Demonstration Sites Evaluation Vocational Education Curriculum Subgroup Work
FEBRUARY	Computer Education Liaison Meeting Curriculum Subgroup Work
MARCH	Final Discussion of Task Force
APRIL	Final Report

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STATEWIDE SURVEY OF COMPUTER USE

The Task Force recognized that national literature reviews and survey results needed to be supplemented with a perspective of current computer use within Maryland. Information was gathered by a statewide survey of the following components of a successful computer education program: (a) planning; (b) curriculum development; (c) staff development; (d) computer use; (e) instructional equity; (f) selection, maintenance, and evaluation of hardware and courseware; and (g) parent and community involvement. On the basis of the survey results the Task Force prepared six interpretive reports and an executive summary explaining the data. This information provided the basis for the remaining Task Force subcommittee work.

Results of the survey indicated widespread interest and planning in Maryland. Computer education curriculum development and subsequent staff development activities are underway in most counties. Equity is being addressed through the selection, placement, and evaluation process for both hardware and software.

The Task Force circulated the results and summaries to each LEA superintendent. The completed reports are available from the State Department of Education upon request. The Task Force found the data so valuable that it believes a survey should be conducted annually to guide policy makers.

The Task Force, therefore, offers its first recommendation:

> RECOMMENDATION 1: The Maryland State Department of Education should conduct an annual statewide survey of computer education to provide data for decision making.

FRAMEWORK FOR COMPUTER EDUCATION

The Task Force responded to its central charge of providing leadership and direction for computer education programs in Maryland by developing a framework for computer education. The model framework was developed after analyzing existing curricula for computer literacy and computer science. This framework was widely circulated for review and comment by LEA personnel.

Brief Statement of the Programmatic Definition for Computer Education

A comprehensive computer education program is defined as a program containing (1) computers as the focus of instruction and (2) computers as instructional support. The use of computers as the focus of instruction involves these components:

- Computer awareness – An understanding of what a computer is and how it affects all aspects of our society.
- Computer literacy – The ability to make effective use of a computer.
- Computer science – The study of computer systems and how to use them to solve problems. This includes computer languages, programming algorithms, data structures, and the structure of computer systems.

Computer awareness, computer literacy, and computer science form a hierarchical framework for computer education. The importance and time devoted to computer awareness and computer literacy may diminish as society becomes more computer literate. Emphasis may shift from the computer as the instructional focus to the computer as instructional support.

The most important computer use in a comprehensive program is the use of computers as a support for instruction in all subject areas. Computer applications to effectively teach appropriate skills and knowledge are stressed for all disciplines. Computers as instructional support involves the following components:

- Computer applications – The use of computers as a problem (situation) solving vehicle by teachers and students in all subject areas.
- Computer-assisted instruction – Instruction and practice presented by the computer.
- Computer-managed instruction – The management of instruction through the use of computers.

The Task Force urges that the complete programmatic definition be obtained from the Department and reviewed. In addition, the Task Force wishes to make the following points about the use of computers in instruction.

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The use of computers to support learning and instruction in the subject areas needs to be based on the well-established characteristics of effective teaching. Computer use, therefore, does not start with computers. It starts with an analysis of the subject; cognitive and affective expectations of the student, and consideration of alternative learning experiences. Educators must ensure that computer technology pursues the goals of general education.

There is a great need for further development in the area of curricular applications. The Task Force concluded that the emerging nature of the field makes it unwise to give specific guidance at this time. It reinforces the need, however, for such developmental work to be done in the state over the coming years.

The programmatic definition addresses the use of computers in instruction for all students and, therefore, is appropriate for students enrolled in special education, gifted and talented, and vocational education programs. These areas should be considered an integral part of the local education system's computer education program, not separate disciplines.

The Task Force recognizes that instructional uses of computers in vocational education be relevant to the job market. Greater linkages with business, industry, and community colleges are essential if local education agencies are to maintain pace with new technology.

Implementation of a comprehensive approach to computer education such as that outlined in the programmatic definition raises a number of crucial issues and needs.

The Task Force, therefore, offers its second set of recommendations:

RECOMMENDATION 2: LEAs should develop a curriculum plan for computer education including objectives and activities (skills continua) based upon the state programmatic definition.

RECOMMENDATION 3: LEAs should develop a systematic plan for the acquisition, placement, and use of sufficient computer hardware and software.

RECOMMENDATION 4: LEAs should devote adequate resources and personnel to provide assistance in acquiring and using computer hardware and software.

RECOMMENDATION 5: LEAs should conduct staff development programs for administrative and instructional personnel to support the computer education program.

RECOMMENDATION 6: LEAs should use the expertise of both curriculum and computer education specialists in evaluating the use of computers in the subject areas.

COMPUTER EDUCATION ISSUES AND NEEDS

The Task Force identified seven major issues and needs in computer education which Maryland schools must confront to implement changes in the curriculum.

Equity

Equity is the most fundamental issue that will arise in the implementation of computer education programs in Maryland. Inequity is not necessarily inherent to computer instruction; however, four categories of potential inequities were outlined.

- o Access to computer equipment
- o The nature of the computer activity
- o Biases in the software
- o Teacher training and teacher attitudes

Student access to computers is affected by factors both external and internal to the school. Externally, students in affluent areas have greater opportunities to achieve computer literacy because many of them have computers at home. Also, wealthier school districts can more readily fund needed school equipment.

Internally, student use of microcomputers is restricted by available equipment. School personnel must examine how they use computers and make decisions regarding computer access.

Schools need to evaluate student computer activity. Some students are restricted to drill and practice while others are using computers for problem solving.

As the presence of microcomputers increases, so does the demand for educational software. These materials must be reviewed for bias in the same manner as textbooks.

Finally, computer equity concerns teacher training and attitudes. If all students are to benefit equally, all teachers must have appropriate skills and attitudes.

In view of the seriousness of potential inequities that might arise, the Task Force offers its third set of recommendations:

> RECOMMENDATION 7: The Maryland State Department of Education's equal opportunity activities should include an expanded focus on computer equity in all areas of education, including regular academic, vocational, gifted, special education programs, as well as extra curricular activities.
>
> RECOMMENDATION 8: The Maryland State Department of Education should develop and disseminate program guidelines for equitable computer program development.

RECOMMENDATION 9: Local and state staff development activities on the use of computers should contain specific information and strategies related to the following topics:

a. Assuring equitable computer access
b. Assuring equitable computer use
c. Evaluating computer software for bias
d. Combating computer anxiety and stereotypes
e. Promoting the equitable participation of minorities and females in computer programs

RECOMMENDATION 10: The local school systems should develop plans for the equitable acquisition, placement, and use of computers in instruction and in extracurricular activities.

RECOMMENDATION 11: The Maryland State Department of Education should use its yearly surveys of computer use to assist school systems in monitoring equity issues.

RECOMMENDATION 12: The Maryland State Department of Education should continue to provide software evaluation and selection guidelines for local education agencies to complement the state bylaw on ethnic and cultural bias of instructional materials and the State Board resolution on sex role stereotyping in materials.

Staff Development

The Task Force believes that effective staff development activities are essential for effective implementation of a computer education program. A number of issues must be addressed in designing such activities. The Task Force examined the inservice activities currently offered in local school systems and concluded that they are too heavily reliant on instruction in programming. The programmatic definition provides guidance for the development of a range of inservice activities for both teachers and administrators. The Task Force further noted the difficulty in obtaining from colleges and universities the types of staff development training needed for the implementation of the programmatic definition. (The issues of articulation with higher education are more fully addressed in a subsequent section.)

The Task Force offers its fourth set of recommendations:

RECOMMENDATION 13: Every LEA should provide teachers with opportunities for computer-related staff development.

RECOMMENDATION 14: Computer training should be linked to the instructional purposes of the teacher.

RECOMMENDATION 15: Staff development should be a formal/informal collaboration between LEAs and higher education.

RECOMMENDATION 16: Administrators should be provided with training on computer uses, equity issues, as well as curricular uses of computers.

RECOMMENDATION 17: Professionals involved with computer education in Maryland should share staff development and curricular materials.

RECOMMENDATION 18: Maryland State Department of Education should involve higher education in providing training and staff development opportunities.

RECOMMENDATION 19: Teachers should have opportunities for training in the equitable use of computers in their respective content areas.

RECOMMENDATION 20: The programmatic definition should be used as the framework for staff development in computers.

RECOMMENDATION 21: The computer education liaison committee should refine the content and process for staff development issues.

Certification

The Maryland State Department of Education has only interim guidelines for certification in computer science. The Task Force examined several types of problems that currently exist in local school systems that need to be addressed through permanent guidelines. A mathematics teacher teaching computer courses without interim certification is conceivably teaching out of field. This may become important in reduction in force and tenure issues. A different type of problem presented to the Task Force arises from the fact that many teachers and supervisors in computer science are self-taught and do not have official course work. The interim guidelines certify a teacher for computer science on the basis of original certification in another field and a total of 24 credit hours in computer science. It is clear from these problems that the Department will have to be sensitive to the current status of teachers throughout Maryland when developing final guidelines.

In view of the need for clarity on this issue, the Task Force offers its fifth set of recommendations:

RECOMMENDATION 22: Maryland State Department of Education should continue to pursue certification guidelines for computer science teachers through a thorough study of the issues.

RECOMMENDATION 23: Maryland State Department of Education should seek creative alternatives to computer science certification.

RECOMMENDATION 24: Maryland State Department of Education should seek guidance from LEA supervisors and teachers on computer certification issues.

RECOMMENDATION 25: The Professional Standards and Teacher Education Advisory Board should establish a committee to examine sound curriculum and standards in training computer science teachers.

a. Use the "Programmatic Definition for Computer Education" as a framework for teacher training.
b. Examine current undergraduate computer science offerings.
c. Use individuals on Task Force as resource persons in this work.

Articulation with Higher Education

The Task Force recognizes the necessity for greater cooperation between public schools and higher education. It is the perception of the Task Force that higher education computer programs should be more responsive to the needs of state teachers.

First, an examination of computer course offerings in Maryland reveals great diversity from college to college. Second, teacher education students do not have sufficient access to computer science programs. Third, model programs and consistent standards for training in computer education programs are lacking.

In view of these concerns, the Task Force offers its sixth set of recommendations:

RECOMMENDATION 26: The Segmental Committee for Higher Education should be apprised of the issues and possible solutions pertaining to computer education training.

RECOMMENDATION 27: Increased MSDE/higher edcuation collaboration on certification, staff development, and course offerings in computer education should be pursued through the Educational Coordinating Committee.

a. A model curriculum for computer education program training at the higher education levels should be developed.
b. Higher education computer education training should be offered at convenient times for public school peonnel.

Demonstration Sites

During its deliberations the Task Force became aware of a number of excellent models in local school systems for using computers in instruction. It also learned of work being done in individual classrooms throughout the state by teachers who have discovered ways to integrate the computer into their subjects or disciplines. Maryland educators should learn from those who are using successful approaches both at the school building and individual classroom level. The Task Force examined ways in which demonstration sites and networking among successful practitioners could be pursued.

Evaluation

The Task Force was concerned about the lack of evaluation studies about the use of computers in instruction. It recognized that the emerging nature of the field made it difficult to complete comprehensive evaluations. However, there is a danger that a large investment will be made without sufficient attention paid to the most effective applications of computers. The Task Force examined certain approaches to evaluation, but was not prepared to make specific recommendations.

The need for evaluation is obvious and must be attended to; therefore, the Task Force offers the following recommendation:

> RECOMMENDATION 31: The Maryland State Department of Education and local school systems should recognize the need to demonstrate the effectiveness of computer education programs through program evaluation strategies.

Clearinghouse

There is great interest around the state in communication, networking, and informational resources on computers. The Task Force adopted the term of "clearinghouse" for activities that would identify and share resources. There are three such activities.

Two major issues surfaced in attempting to meet these needs: one, how to help teachers overcome barriers of access to demonstration sites and two, how to initiate networking for demonstration programs.

In recognizing of the value of an information-exchange system and of the importance of keeping pace with rapid technology, the Task Force offers its seventh set of recommendations:

RECOMMENDATION 28: The Maryland State Department of Education should pursue the use of computer demonstration sites.

RECOMMENDATION 29: A communication networking process should be established for teachers, administrative and supervisory staff, and others interested in effective computer education practices.

RECOMMENDATION 30: The Maryland State Department of Education should conduct teacher focused demonstration activities in computer education such as summer institutes, conferences, or weekend workshops.

The Library Media Services Branch, MSDE, developed the Maryland Instructional Resources Network (MIRN) to review software and material. This computerized database is available to all local education agencies. The Task Force readily gave support to MIRN and encourages its use throughout Maryland.

Meetings for sharing information directly was judged the most useful communication method at the current time. Therefore, the Task Force supports the formation of a liaison group, approved by LEA superintendents to facilitate the exchange of computer information and offer advice in the development of computer education programs.

A statewide newsletter was discussed as another valuable communication effort. One institution of higher education responded to the request for proposal sent out by the Task Force.

In response to the clearinghouse needs of local education agencies, the Task Force offers its final set of recommendations:

RECOMMENDATION 32: Maryland State Department of Education and local education agencies should support and use the Maryland Instructional Resources Network (MIRN).

RECOMMENDATION 33: A computer education liaison committee should be maintained for the direct sharing of information among local education agencies.

RECOMMENDATION 34: The University of Maryland Baltimore County proposal for statewide newsletter should be accepted and initiated in fiscal year 1985.

CONCLUSION

The Task Force on Use of Computers in Instruction has undertaken initiatives which will have important effects upon the development of computer education in the State of Maryland. It has provided the State Department of Education and local school systems with products and information which will enable them to exercise effective leadership in computer education. The Task Force has identified major issues in computer education and outlined courses of action which the Department, local school systems, and colleges and universities should take. The Task Force urges that its recommendations be implemented as quickly as possible.